

Altivar 66 Telemecanique

User's manual

Variable speed controllers
for asynchronous motors

constant / variable torque :

2.2 to 250 kW, 400 V

constant / variable torque :

3 to 400 HP, 460 V

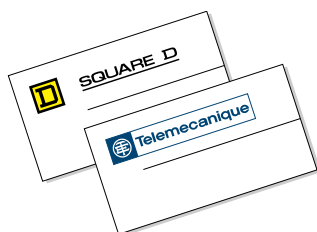
constant / variable torque :

2.2/3 to 30/37 kW, 230 V

constant / variable torque :

3/5 to 40/50 HP, 230 V

receipt, installation and start-up



GROUPE SCHNEIDER

■ Merlin Gerin ■ Square D ■ Telemecanique



When the speed controller power supply is switched on, the power units as well as a certain number of control components are connected to the AC supply. *Contact with these parts is extremely dangerous.*

After switching off the Altivar, *wait 1 minute before performing any operation inside the controller.* This period corresponds to the time for the discharge of the capacitors.

During operation the motor can be stopped by cancelling the run command or the speed reference, while the speed controller remains energized. If it is necessary to prevent restarting for personnel safety reasons, this electronic interlock is insufficient. *Provision must be made for the disconnection of the power circuit.*

The speed controller includes safety devices which, in the event of a fault, can cause the stopping of the controller, and hence the motor. The motor itself can also be subject to stoppage by mechanical jamming. Finally, voltage fluctuations, and power supply failures in particular, can also cause the motor to stop.

The clearance of the fault causing the stoppage can initiate a restart involving a hazard for certain types of machines or installations, especially those which must conform to specific safety regulations.

It is therefore important that in such cases the user should take appropriate steps to prevent such restarting. For example by the use of an underspeed detector, causing the disconnection of the speed controller power supply in the event of a non-programmed motor stoppage.

Equipment design must conform to specifications set out in the IEC standards.

As a general rule, *the speed controller power supply must always be switched off* before performing any operation on either the electrical or the mechanical parts of the installation.

The company reserves the right to change the characteristics of its products and services at any time to incorporate the latest technological developments. The information contained in this document is therefore subject to change without notice and cannot be construed as containing any form of contractual obligation.



Warning

The Altivar 66 must be considered as a component. It is neither a machine nor a device ready for use in accordance with European standards (EN 60204-1 on the safety of machines, EN 50081 and 82 on electromagnetic compatibility). It is the responsibility of the end user to ensure that his machine conforms to these standards.

This speed controllers must be installed and implemented in compliance with the international and national standards in force in the premises where it is to be used. Conformity is under the responsibility of the integrator who will comply with the EMC directive, among others, for what concerns the European Community.

Compliance with the essential requirements specified in the EMC directive is namely conditioned by application of the prescriptions provided in our catalogue which indicates the accessories to be associated with variators, for instance when radio disturbance filtering is needed.

For any information about these documents, please contact our SCHNEIDER commercial agency.

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Preliminary checks

Receipt

Check that the speed controller reference code printed on the label is that same as that on the delivery note corresponding to the purchase order.

Open the packaging and check that the Altivar 66 has not been damaged during transport.

Handling and storage

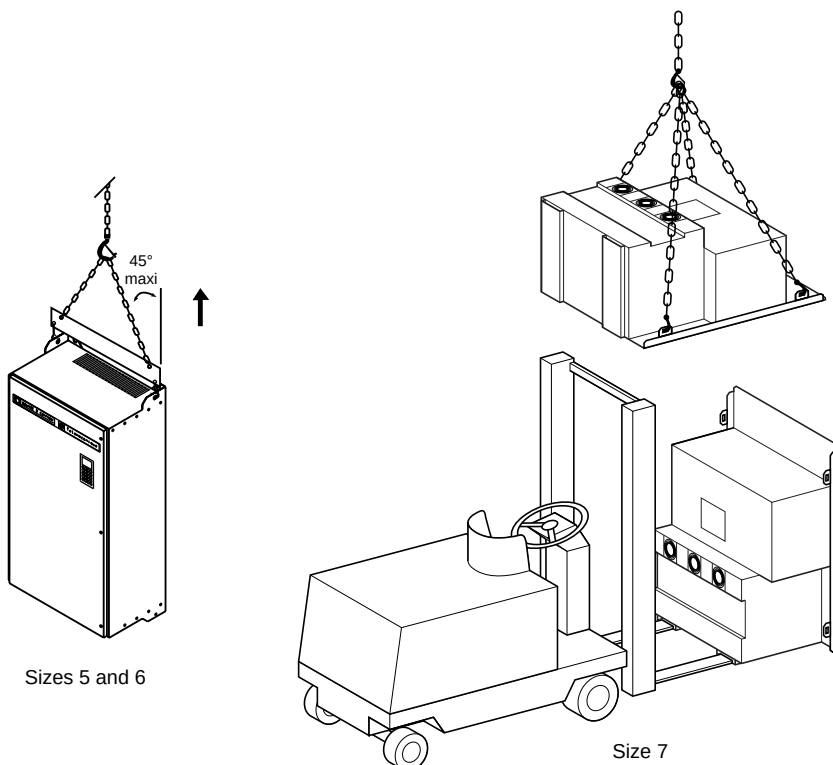
To ensure that the speed controller is protected prior to installation, handle and store it in its packaging.

Handling prior to installation

The Altivar 66 400-460 V range consists of 19 models divided into 7 sizes. The Altivar 66 208-230 V range consists of 8 models divided into 5 sizes.

Sizes 1 to 4 can be removed from their packaging and installed manually.

From size 5 upwards, a hoist must be used.





Motor-speed controller combination

Preliminary comments

Motor power rating

In the tables on pages 4 to 12, the values given are the standard power ratings.

At 460 V - 60 Hz, the HP ratings conform to NEC (National Electrical Code).

There is no HP equivalent on a 460 V supply for a motor rated at 3 kW on a 400 V AC supply, while the ATV-66U54N4 speed controller can be supplied at 460 V - 60 Hz.

Line current

The line current corresponds to the current consumed by the speed controller at nominal operating power on an AC supply with an impedance to limit the presumed short-circuit current to :

- 12000 A for a 208 V - 50/60 Hz supply voltage,
- 22000 A for a 230 V - 50/60 Hz supply voltage,
- 22000 A for a 400 V - 50 Hz supply voltage,
- 65000 A for a 460 V - 60 Hz supply voltage.

Providing the supply via a power transformer suitable for the speed controller, or adding a line choke from the catalogue, reduces current consumption to a value close to the speed controller nominal current.

Example : ATV-66D23N4 with 15 kW motor on a 400 V AC supply.

Constant torque application : $I_{nv} = 33$ A.

Line current with no choke : 45 A.

Line current with choke from catalogue : 28 A.

Variable torque applications

For variable torque applications not involving high switching frequency ([see tables on pages 6, 7 and 11](#)), limiting overtorque makes it possible to use a speed controller with a motor with a higher power rating.

ATV-66U41N4 speed controller

When a speed controller is used with a motor whose power rating is below 2.2 kW (or 3 kW for variable torque), the speed controller should be reconfigured via the graphic terminal to adapt its integral thermal protection ([see the Programming Manual](#)).



Motor-speed controller combination

Constant torque applications (switching frequency 4 kHz)

Supply voltage : 400 V $\pm$ 15 % and 460 V $\pm$ 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	400 V 50 Hz	460 V 60 Hz				
	kVA	kW	HP	A	A	A	W
ATV-66U41N4 (see page 3)	4.1	0.75	–	4	2.3	3.2	100
		–	1	3.5	1.8	2.7	95
		1.5	–	6.5	4.1	5.6	123
		–	2	6	3.4	5.1	117
		2.2	–	9	5.8	8	146
		–	3	9	4.8	7.2	140
ATV-66U54N4	5.4	3	–	12	7.8	10.7	173
ATV-66U72N4	7.2	4	–	15	10.5	14.3	209
		–	5	13	7.6	11.4	195
ATV-66U90N4	9	5.5	–	20	13	17.7	251
		–	7.5	18	11	16.5	225
ATV-66D12N4	12	7.5	–	26	17.6	24	317
		–	10	24	14	21	290
ATV-66D16N4	16	11	–	35	24.2	33	447
		–	15	34	21	31.5	380
ATV-66D23N4	23	15	–	45	33	45	580
		–	20	44	27	40.5	530
ATV-66D33N4	33	22	–	60	48.4	66	754
		–	30	59	40	60	655
ATV-66D46N4	46	30	–	78	66	90	1060
		–	40	75	52	78	880



Motor-speed controller combination

Constant torque applications (switching frequency 2 kHz)

Supply voltage : 400 V $\pm$ 15 % and 460 V $\pm$ 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	400 V 50 Hz	460 V 60 Hz				
	kVA	kW	HP	A	A	A	W
ATV-66D54N4	54	37	–	94	79.2	108	1159
		–	50	92	65	97.5	885
ATV-66D64N4	64	45	–	110	93.5	127.5	1374
		–	60	105	77	115.5	1055
ATV-66D79N4	79	55	–	130	115.5	157.5	1610
		–	75	128	96	144	1270
ATV-66C10N4	100	75	–	171	151.8	207	2175
		–	100	173	124	186	
ATV-66C13N4	130	90	–	198	187	258	2525
		–	125	211	156	234	1952
ATV-66C15N4	150	110	–	237	226	307.5	3000
		–	150	246	180	270	2251
ATV-66C19N4	190	132	–	275	270	367.5	3500
		–	200	314	240	360	3067
ATV-66C23N4	230	160	–	326	330	450	
		–	250	379	300	450	4483
ATV-66C28N4	280	200	–	399	407	555	
		–	300	441	360	540	5246
ATV-66C31N4	310	220	–	421	448.8	612	
		–	350	506	420	630	5966



Motor-speed controller combination

Variable torque applications (switching frequency 4 kHz)

Supply voltage : 400 V $\pm$ 15 % and 460 V $\pm$ 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	400 V 50 Hz	460 V 60 Hz				
	kVA	kW	HP	A	A	A	W
ATV-66U41N4 (see page 3)	4.9	0.75	—	4	2	2.2	97
		—	1	3.5	1.8	2	90
		1.5	—	6.5	3.7	4	118
		—	2	6	3.4	3.8	110
		2.2	—	9	5.3	5.8	130
		—	3	9	4.8	5.3	
		3	—	12	7.1	7.8	164
ATV-66U54N4	6.5	4	—	16	9.5	10.5	196
		—	5	12	7.6	8.4	180
ATV-66U72N4	8.2	5.5	—	20	11.8	13	230
		—	7.5	18	11	12.1	205
ATV-66U90N4	11	7.5	—	25	16	17.6	295
		—	10	23	14	15.4	265
ATV-66D12N4	15.2	11	—	36	22	24.2	384
		—	15	34	21	23.1	350
ATV-66D16N4	20.7	15	—	45	30	33	487
		—	20	43	27	29.7	480
ATV-66D23N4	28	18.5	—	57	37	40.7	620
		—	25	54	34	37.4	560
ATV-66D33N4	42	22	—	60	44	48.4	600
		—	30	59	40	44	
		30	—	79	60	66	860
		—	40	75	52	57.2	800
ATV-66D46N4	50	37	—	94	72	79.2	1069
		—	50	90	65	71.5	910



Motor-speed controller combination

Variable torque applications (switching frequency 2 kHz)

Supply voltage : 400 V $\pm$ 15 % and 460 V $\pm$ 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	400 V 50 Hz	460 V 60 Hz				
	kVA	kW	HP	A	A	A	W
ATV-66D54N4	59	45	–	112	85	93.5	1171
		–	60	107	77	84,7	960
ATV-66D64N4	73	55	–	130	105	115.5	1374
		–	75	128	96	105.6	1150
ATV-66D79N4	99	75	–	176	138	151.8	1760
		–	100	166	124	136.4	1400
ATV-66C10N4	119	90	–	199	170	187	2400
		–	125	210	156	171	
ATV-66C13N4	140	110	–	238	205	226	2800
		–	150	246	180	198	
ATV-66C15N4	170	132	–	278	245	270	3300
		–	200	314	240	264	
ATV-66C23N4	208	160	–	336	300	330	4483
		–	250	379	300	330	
ATV-66C23N4	257	200	–	399	370	407	5246
		–	300	443	360	396	
ATV-66C28N4	283	220	–	428	408	449	5966
		–	350	506	420	462	
ATV-66C31N4	319	250	–	472	460	506	6624
		–	400	571	477	525	



Motor-speed controller combination

Low noise variable torque applications (switching frequency 10 kHz)

Supply voltage : 400 V $\pm$ 15 % and 460 V $\pm$ 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	400 V 50 Hz	460 V 60 Hz				
	kVA	kW	HP	A	A	A	W
ATV-66U41N4 (see page 3)	3.6	0.75	–	4	2	2.2	111
		–	1	3.5	1.8	2	90
		1.5	–	6.5	3.7	4	142
		–	2	6	3.4	3.8	110
		2.2	–	9	5.3	5.8	174
		–	3	9	4.8	5.3	130
ATV-66U54N4	4.9	3	–	13	7.1	7.8	210
ATV-66U72N4	6.5	4	–	15	9.5	10.5	258
		–	5	12	7.6	8.4	180
ATV-66U90N4	8.1	5.5	–	20	11.8	13	311
		–	7.5	18	11	12.1	205
ATV-66D12N4	11	7.5	–	26	16	17.6	398
		–	10	23	14	15.4	265
ATV-66D16N4	15	11	–	35	22	24.2	490
		–	15	34	21	23.1	350
ATV-66D23N4	20	15	–	45	30	33	614
		–	20	43	27	29.7	480
ATV-66D33N4	30	22	–	60	44	48.4	796
		–	30	59	40	44	600
ATV-66D46N4	41	30	–	78	60	66	1182
		–	40	75	52	57.2	800



Motor-speed controller combination

Low noise variable torque applications (switching frequency 4 kHz)

Supply voltage : 400 V $\pm$ 15 % and 460 V $\pm$ 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	400 V 50 Hz	460 V 60 Hz				
	kVA	kW	HP	A	A	A	W
ATV-66D54N4	49	37	–	94	72	79.2	1096
		–	50	90	65	71.5	910
ATV-66D64N4	58	45	–	110	85	93.5	1292
		–	60	107	77	84.7	960
ATV-66D79N4	73	55	–	130	105	115.5	1433
		–	75	128	96	105.6	1150

Note

ATV-66C10N4 to C31N4 speed controllers are not designed for low noise variable torque applications with high switching frequency.



Motor-speed controller combination

Constant torque applications (switching frequency 4 kHz)

Supply voltage : 208 V - 10 % to 230 V + 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	208 V 50/60 Hz					
	kVA	kW	HP	A	A	A	W
ATV-66U41M2	4,2	2,2	3	14,7	11,7	15,9	170
ATV-66U72M2	6,6	4	5	24,2	18,4	25	239
ATV-66U90M2	9,6	5,5	7,5	32	26,6	37	354
ATV-66D12M2	12,2	7,5	10	41	34	47	437
ATV-66D16M2	18,3	11	15	57	51	70	589
ATV-66D23M2	23,5	15	20	71	66	89	728
ATV-66D33M2	34,9	22	30	97	97	132	1052
ATV-66D46M2	45,3	30	40	126	126	172	1439



Motor-speed controller combination

Variable torque applications (switching frequency 4 kHz)

Supply voltage : 208 V - 10 % to 230 V + 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	208V 50/60 Hz					
	kVA	kW	HP	A	A	A	W
ATV-66U41M2	6	3	5	19,1	16,7	18,4	192
ATV-66U72M2	8,7	5,5	7,5	32	24,2	26,6	302
ATV-66U90M2	11,1	7,5	10	41	31	34	414
ATV-66D12M2	16,6	11	15	56	47	51	559
ATV-66D23M2	21,4	15	20	72	60	66	770
ATV-66D23M2	27	18,5	25	86	75	83	831
ATV-66D33M2	41,2	30	40	125	116	126	1260
ATV-66D46M2	51,5	37	50	151	143	158	1528



Motor-speed controller combination

Low noise variable torque applications (switching frequency 10 kHz)

Supply voltage : 208 V - 10 % to 230 V + 15 %, 50 Hz $\pm$ 5 % or 60 Hz $\pm$ 5 %

Speed controller		Motor power rating		Line current	Controller nominal current (Inv)	Controller maximum transient current (60 s)	Total power dissipated at nominal load
Reference	Power	208V 50/60 Hz					
	kVA	kW	HP	A	A	A	W
ATV-66U41M2	3,8	2,2	3	14,8	10,6	11,7	181
ATV-66U72M2	6	4	5	24,3	16,7	18,4	252
ATV-66U90M2	8,7	5,5	7,5	32	24,2	26,6	375
ATV-66D12M2	11,1	7,5	10	41	31	34	459
ATV-66D16M2	16,6	11	15	57	47	51	619
ATV-66D23M2	21,4	15	20	71	60	66	785
ATV-66D33M2	31,7	22	30	98	88	97	1127
ATV-66D46M2	41,2	30	40	126	115	126	1332



Available torque

Continuous operation

For naturally ventilated motors, motor cooling is linked to speed. This leads to derating for speeds which are below half the nominal speed.

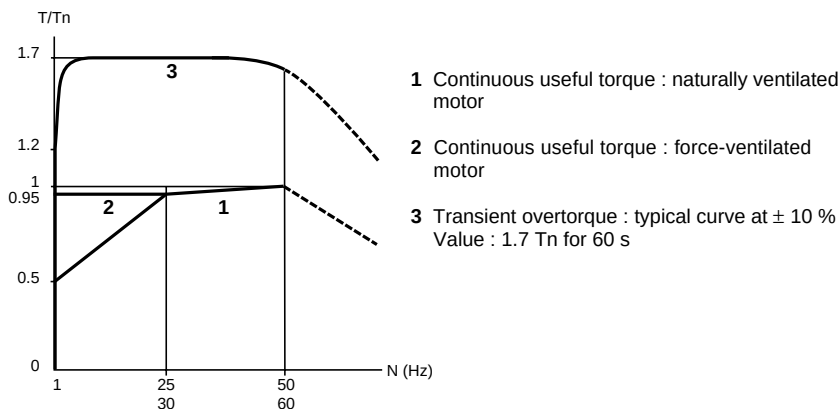
Transient operation

The overtorque depends on the maximum transient current which the speed controller can supply. On starting : up to 2 In for 0.2 s

Overspeed operation

As the voltage can no longer vary as the frequency when the rated speed is exceeded, leading to a decrease in motor induction which results in a loss of torque. Check with the manufacturer that the motor can operate at overspeed.

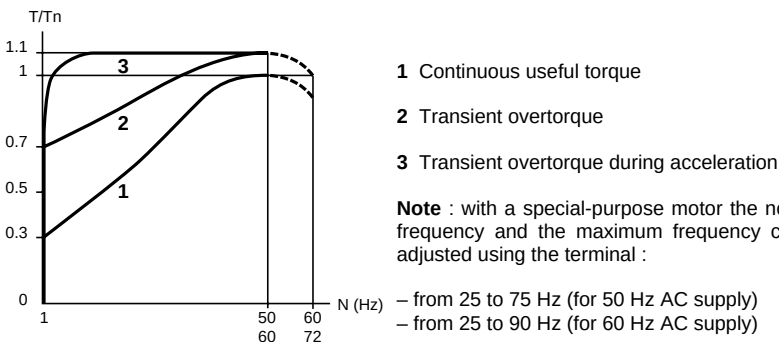
Constant torque applications : torque characteristics



Note : The rated and maximum frequencies can be controlled.

- from 25 to 400 Hz for ATV-66U41N4 to D79N4 controllers, and ATV-66U41M2 to D46M2 controllers.
- from 25 to 200 Hz for ATV-66C10N4 and C31N4 controllers.

Variable torque applications : torque characteristics





Characteristics

Output voltage	Maximum voltage equal to that of AC supply voltage
Frequency range	0.1 to 50/60 Hz Extension possible : – up to 200/400 Hz for constant torque application – up to 75/90 Hz for variable torque application
Frequency resolution	0.05 Hz with analog reference signal at HSP = 50 Hz (10 bits) 0.015 Hz with digital reference signal (12 bits + sign)
Acceleration and deceleration ramps	Individually adjustable from 0.1 to 999.9 s (resolution 0.1 s) Automatic adaptation of the ramp times in the event of the torque capacity being exceeded
Main protective and safety devices of the speed controller	Protection against short-circuits : – between output phases – between output phases and earth (ground) – on internal supply outputs – on logic and analog outputs Thermal protection against overheating AC supply overvoltage and undervoltage protection Protection in the event of an AC supply phase fault
Motor protection	Integrated electronic thermal protection (calculation of $I^2 t$ taking frequency into account) Memorization of motor thermal state Protection against phase faults
Degree of protection	IP 30 – NEMA type 1 cover closed, IP 20 cover open : controllers ATV-66U41N4 to D79N4 and ATV-66U41M2 to D46M2 IP 30 - NEMA type 1 cover closed, IP 00 cover open : controllers ATV-66C10N4 to C19N4 IP 00 controller ATV-66C23N4 to C31N4
Ambient air temperature	Operation : 0 °C to + 40 °C ATV-66U41N4 to D79N4 and ATV-66U41M2 to D46M2 : operation possible up to + 60 °C with ventilation kit and current derating of 2,2% per °C between + 40 °C and + 60 °C Storage : - 25 °C to + 70 °C



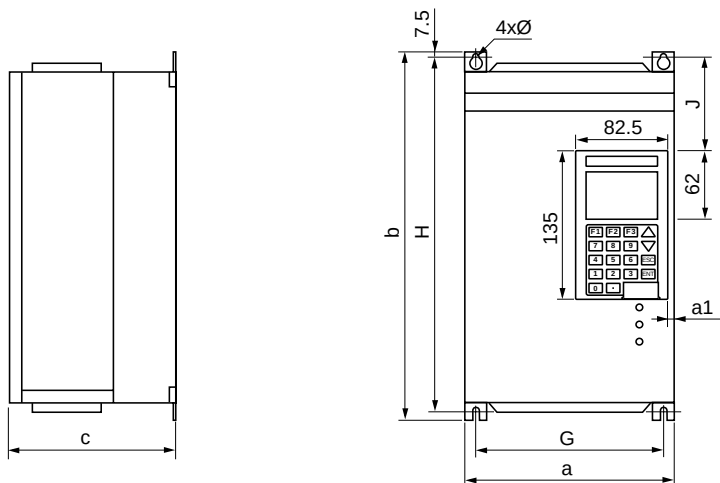
Characteristics

Maximum operating altitude	1000 m without derating (above this, derate the current by 1 % for each additional 100 m)
Maximum relative humidity	93 % without condensation or dripping water, conforming to IEC 68-2-3
Degree of pollution	Degree 3 conforming to IEC 664-1
Vibration resistance	Conforming to IEC 68-2-6 : – 1,5 mm peak to peak from 3 to 13 Hz– 1mm from 13 to 22.3 Hz and 2 gn from 22.3 to 150 Hz : ATV-66U41N4 to D23N4 and ATV-66U41M2 to D16M2 – 1.5 mm peak to peak from 3 to 13 Hz and 1 gn from 13 to 150 Hz : ATV-66D33N4 to D79N4 and ATV-66D23M2 to D46M2 speed controllers – 0.15 mm from 10 to 58 Hz and 1 gn from 58 to 150 Hz : ATV-66C10N4 to C31N4
Shock resistance	Conforming to IEC 68-2-27 : 15 g, 11 ms

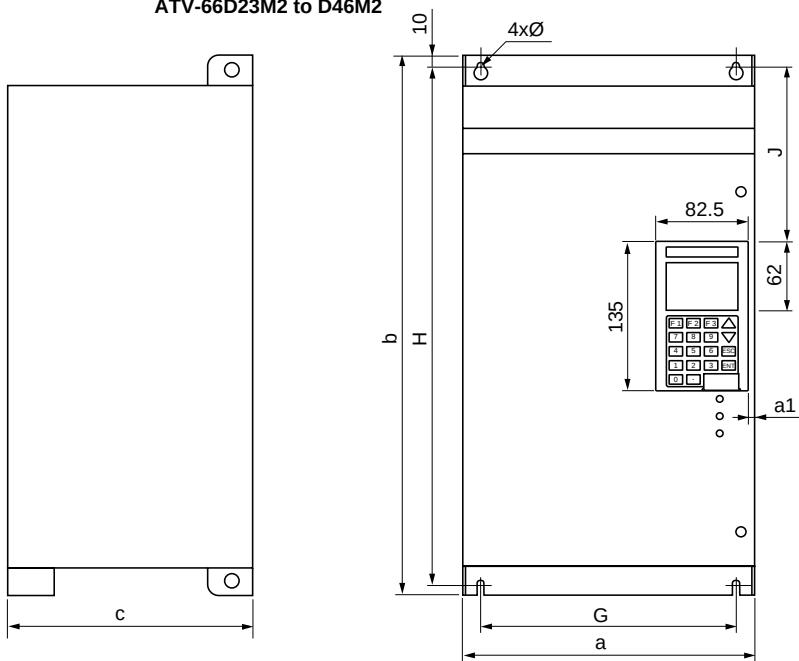


Dimensions

**Sizes 1 to 3 : ATV-66U41N4 to D23N4
ATV-66U41M2 to D16M2**



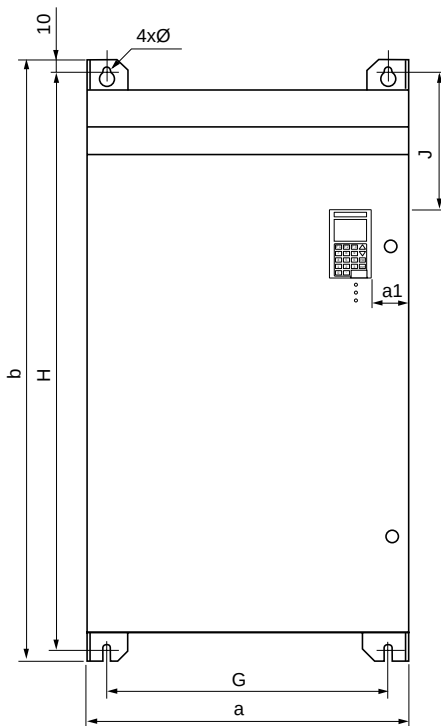
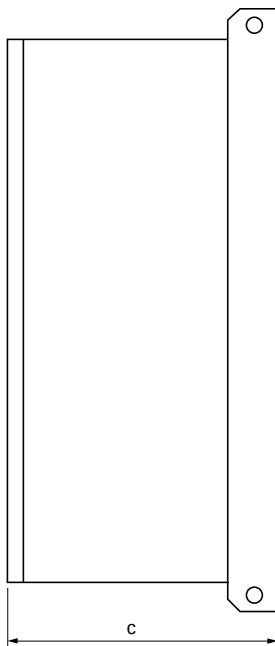
**Sizes 4 and 5 : ATV-66D33N4 to D79N4
ATV-66D23M2 to D46M2**





Dimensions

Size 6 : ATV-66C10N4 to C19N4

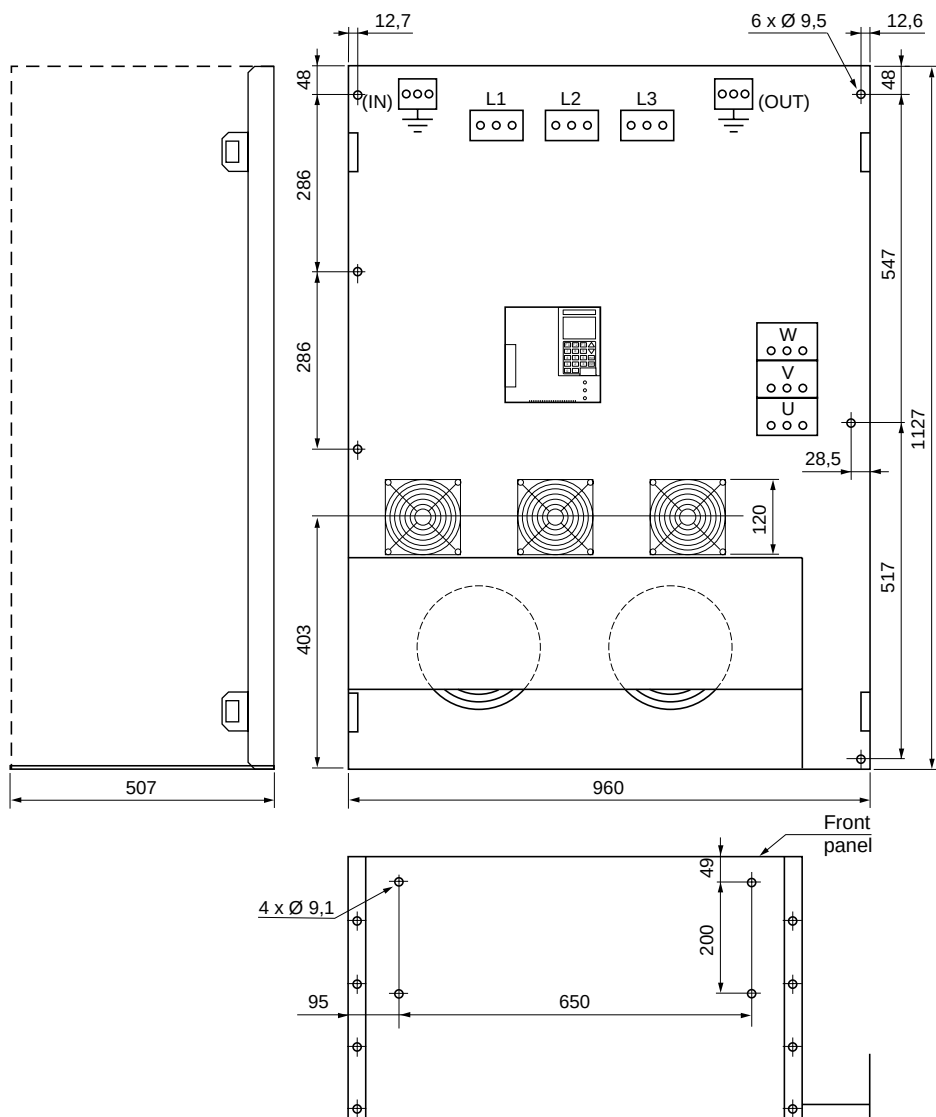


Size	Altivar reference	a mm	b mm	c mm	G mm	H mm	J mm	Ø mm	a1 mm	Weight kg
1	ATV-66U41N4 ATV-66U54N4 ATV-66U72N4 ATV-66U41M2	200	295	165	175	278	35.4	5.5	6	4.7
2	ATV-66U90N4 ATV-66D12N4 ATV-66U72M2 ATV-66U90M2	234	325	195	209	308	44.3	5.5	6	7.3
3	ATV-66D16N4 ATV-66D23N4 ATV-66D12M2 ATV-66D16M2	234	416	245	209	398	79	5.5	6	14
4	ATV-66D33N4 ATV-66D46N4 ATV-66D23M2 ATV-66D33M2	243	600	280	205	580	116.4	7	12	27
5	ATV-66D54N4 ATV-66D64N4 ATV-66D79N4 ATV-66D46M2	350	650	300	300	620	121.4	9	12	40 41 41 41
6	ATV-66C10N4 ATV-66C13N4 ATV-66C15N4 ATV-66C19N4	585	980	370	525	960	205	11	70	127 136 136 136



Dimensions

Size 7 : ATV-66C23N4 to C31N4



Bottom view

Weight : 255 kg



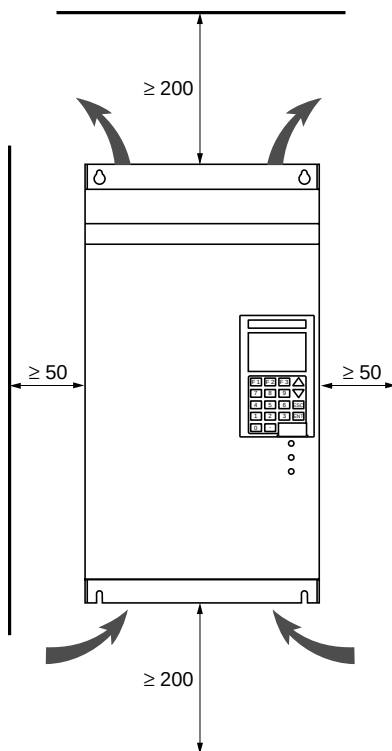
Mounting recommendations (sizes 1 to 5)

Install the device vertically.

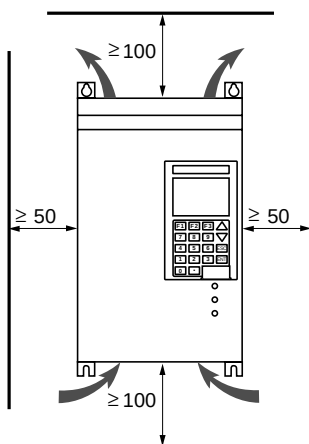
Do not place it close to heating elements.

Leave sufficient clearance to allow circulation of air necessary for cooling. Ventilation is from the bottom to the top of the device.

Sizes 4 and 5



Sizes 1 to 3



Ventilating fan flow rates

ATV-66U41N4 and U54N4 (size 1)	: 5 dm ³ /s
ATV-66U72N4, ATV-66U41M2 (size 1)	: 10 dm ³ /s
ATV-66U90N4 and D12N4, ATV-66U72M2 and U90M2 (size 2)	: 22 dm ³ /s
ATV-66D16N4 and D23N4, ATV-66D12M2 and D16M2 (size 3)	: 47 dm ³ /s
ATV-66D33N4 to D79N4, ATV-66D23M2 to D46M2 (sizes 4 and 5)	: 100 dm ³ /s

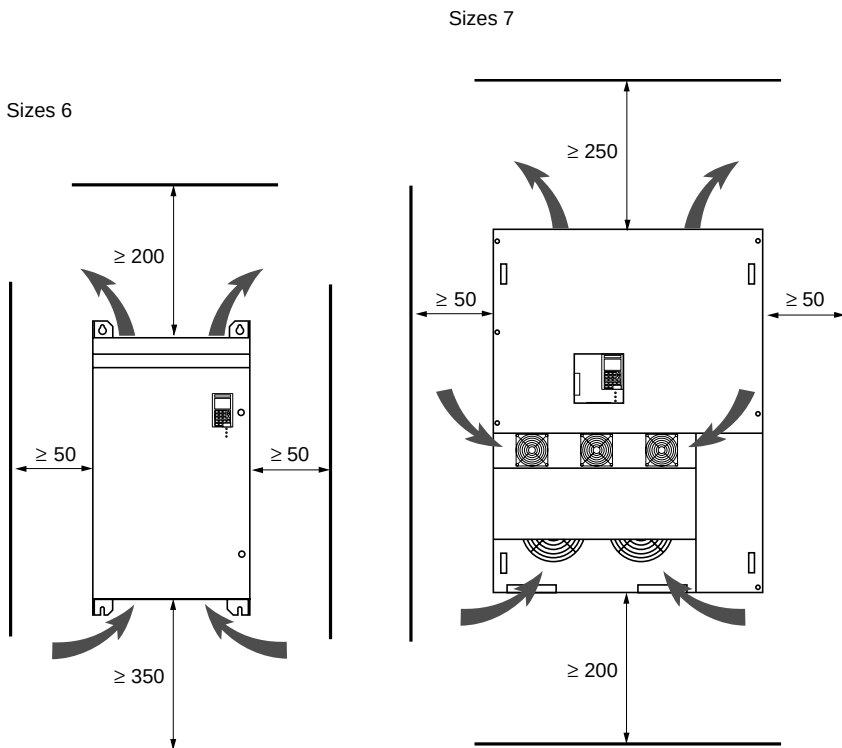


Mounting recommendations (sizes 6 and 7)

Install the device vertically.

Do not place it close to heating elements.

Maintain enough clearance for the cooling air flow that a fan provides from bottom to top for Size 6 unit and from the bottom of the front panel to the top for Size 7 unit.



Ventilating fan flow rates

ATV-66C10N4 to C19N4 (size 6) : $250 \text{ dm}^3/\text{s}$

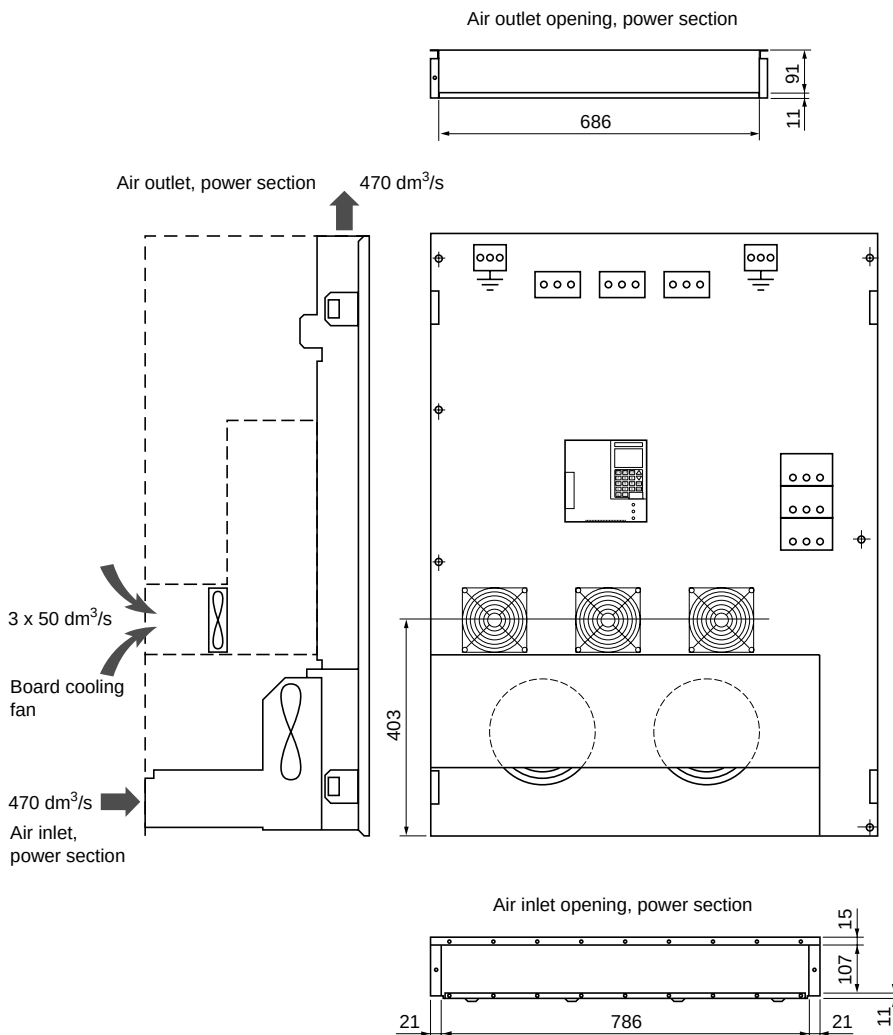
ATV-66C23N4 to C31N4 (size 7) : $470 \text{ dm}^3/\text{s}$

Recommendation for installing a Size 7 unit in a cabinet : A clearance greater than 250 mm should be provided between the VSC and the cabinet walls for easier routing of cables and easier access to the unit.



Mounting recommendations (size 7)

Principle of forced-air cooling in IP 00



Recommendation : Hot air must be exhausted to the outside.



The IP00 version of the Altivar 66 Size 7 unit must be equipped with a protective barrier to ensure personnel safety against electric shocks.



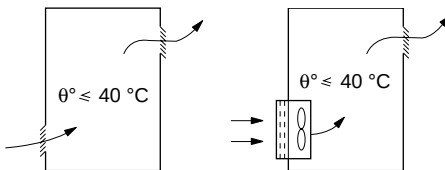
Mounting in a wall-fixing or floor-standing enclosure

Metal enclosure, degree of protection IP 23 or IP 54

Observe the mounting recommendations given on [pages 19 to 21](#).

To ensure adequate air circulation inside the speed controller :

- provide ventilation louvres,
- check that the ventilation is adequate. If not fit a forced ventilation unit with a filter,
- use special filters at IP 54.



Dust and damp proof metal enclosure (degree of protection IP 54)

Under certain environmental conditions the speed controller must be mounted in a dust and damp proof enclosure : dust, corrosive gas, high humidity with a risk of condensation or dripping water, splashing liquid, etc.

Observe the mounting recommendations given on [pages 19 to 21](#).

To avoid hot spots in the speed controller, add a ventilation kit to circulate the air inside the device.

This arrangement makes it possible to use the speed controller in an enclosure whose maximum internal temperature can reach 60 °C.

Warning

In this case, derate the speed controller nominal current by 2.2 % for each °C above 40 °C.

Ventilation kit references : **VW3-A66821** for ATV-66U41N4 to U72N4
ATV-66U41M2 (size 1)
VW3-A66822 for ATV-66U90N4 to D23N4
ATV-66U72M2 to D16M2 (sizes 2 and 3)
VW3-A66824 for ATV-66D33N4 to D46N4
ATV-66D23M2 to D33M2 (size 4)
VW3-A66825 for ATV-66D54N4 to D79N4
ATV-66D46M2 (size 5)

Calculating the size of the enclosure

Maximum thermal resistance R_{th} (°C/W) :

$$R_{th} = \frac{\theta^{\circ} - \theta^{\circ}e}{P}$$

θ° = maximum temperature in the enclosure in °C,
 $\theta^{\circ}e$ = maximum external temperature in °C,
 P = total power dissipated in the enclosure in W.

Power dissipated by the speed controller : [see pages 4 to 12](#).

Add the power dissipated by the other component parts of the device.

Useful heat exchange surface of the enclosure S (m²) :
(sides + upper surface + front panel, when wall mounted)

$$S = \frac{K}{R_{th}}$$

K = thermal resistance per m² of enclosure.

For a metal enclosure : $K = 0.12$ with internal fan,
 $K = 0.15$ with no fan.

Warning : do not use insulated enclosures, as they have a poor level of conductivity.



Mounting in a wall-fixing or floor-standing enclosure

Flush mounting (sizes 1 to 3)

To reduce the power dissipated in the enclosure, the speed controller can be flush mounted, with the heatsink on the outside. This necessitates making a cut-out in the rear of the enclosure and using a mounting kit which comprises : dust and damp proof gaskets, leaflet and a cut-out drawing.

IP 54 kit references : **VW3-A66801** for ATV-66U41N4 to U72N4
ATV-66U41M2 (size 1)
VW3-A66802 for ATV-66U90N4 and D12N4
ATV-66U72M2 to U90M2 (size 2)
VW3-A66803 for ATV-66D16N4 and D23N4
ATV-66D12M2 to D16M2 (size 3)

Mounting as an air heat exchanger with the exterior (sizes 1 to 5)

To reduce the power dissipated in the enclosure, the speed controller can be fitted with adaptors which enable the ventilation fan to draw in cool air at the bottom of the controller and evacuate hot air at the top.

This necessitates making a two cut-outs in the rear of the enclosure and using a mounting kit which comprises : adaptors, dust and damp proof gaskets, leaflet and a cut-out drawing.

Kit references : **VW3-A66811** for ATV-66U41N4 to U72N4
ATV-66U41M2 (size 1)
VW3-A66812 for ATV-66U90N4 and D12N4
ATV-66U72M2 and U90M2 (size 2)
VW3-A66813 for ATV-66D16N4 and D23N4
ATV-66D12M2 and D16M2 (size 3)
VW3-A66814 for ATV-66D33N4 and D46N4
ATV-66D23M2 and D33M2 (size 4)
VW3-A66814 for ATV-66D54N4 to D79N4
ATV-66D46M2 (size 5)

With each of these mounting methods, the maximum internal temperature in the enclosure can reach 60 °C without having to derate the speed controller current. To avoid hot spots, use the ventilation kit to circulate the air inside the speed controller.

Note : with each of these mounting methods, the heatsink and ventilation fan outside the enclosure remains protected to IP 30.



Mounting in a wall-fixing or floor-standing enclosure

Power dissipated by the speed controller in the enclosure using one of the mounting methods			
Altivar reference	Power in W	Altivar reference	Power in W
ATV-66U41N4	70	ATV-66U41M2	70
ATV-66U54N4	70	ATV-66U72M2	70
ATV-66U72N4	70	ATV-66U90M2	110
ATV-66U90N4	75	ATV-66D12M2	130
ATV-66D12N4	75	ATV-66D16M2	130
ATV-66D16N4	110	ATV-66D23M2	145
ATV-66D23N4	130	ATV-66D33M2	200
ATV-66D33N4	130	ATV-66D46M2	200
ATV-66D46N4	145		
ATV-66D54N4	198		
ATV-66D64N4	200		
ATV-66D79N4	210		

Possibility of condensation

If the device is left switched off for long periods, a heating system must be provided (0.2 to 0.5 W per 10 cm² of the enclosure) which switches on automatically as soon as the device stops.

This device keeps the inside of the enclosure at a temperature slightly above the external temperature, and avoids any risk of condensation or dripping water while the device is switched off.

Alternative solution : keep the device powered up when it is stopped (the heat of the device itself when it is powered up is generally sufficient to provide this difference in temperature).



Access to terminal blocks (sizes 1 to 5)

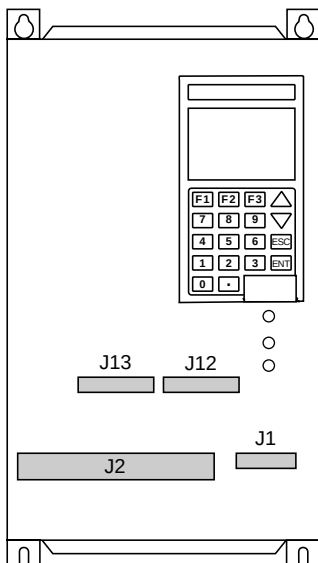
The protective cover is attached to the front panel of the Altivar in the following way :

- Sizes 1 to 3 : clip-on attachment,
- Sizes 4 and 5 : using 2 captive screws.

To access the terminal blocks, detach the cover and pivot it from right to left.

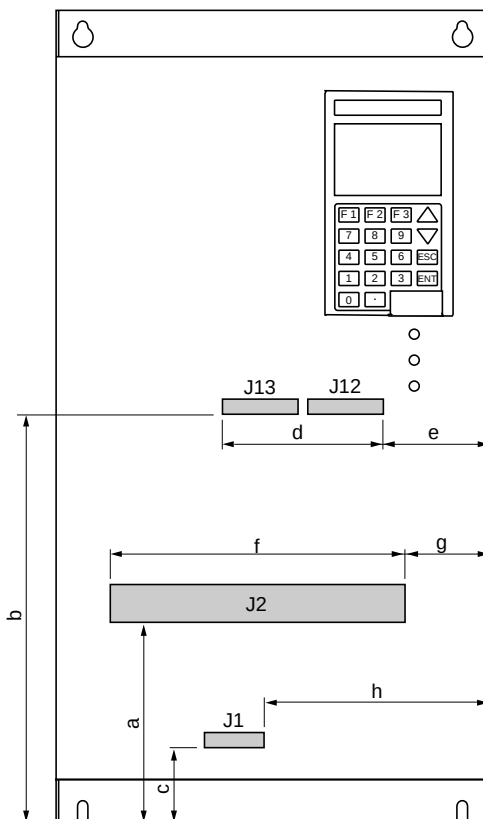
Location of the terminal blocks

Sizes 1 to 3



	a mm	b mm	c mm	d mm	e mm	f mm	g mm	h mm
S4	110	300	80	100	60	180	40	180
S5	200	320	90	100	60	220	60	170

Sizes 4 and 5



The connection cables enter through the base of the Altivar ([see page 37 and 38](#)) :

- sizes 1 to 3 : via holes which are fitted with cable glands in the insulating plate (attached with 2 screws), or via the opening created by the removal of this plate.
- sizes 4 and 5 : via holes which are fitted with cable glands in the metal plate or via the opening created by the removal of this plate.

When the plate is removed the degree of protection of the speed controller becomes IP 20.



Power terminal blocks (sizes 1 to 5)

Terminal blocks

J13 : control card analog I/O.

J12 : control card logic I/O.

J1 : relay logic outputs.

J2 : power terminal block.

J2 terminals	Function	Maximum connection capacity Terminaltightening torque				
		Size 1	Size 2	Size 3	Size 4	Size 5
	Earth (ground) terminal connected to Altivar earth	6 mm ² 1,96 Nm	6 mm ² 1,96 Nm	10 mm ² 2,5 Nm	35 mm ² 4 Nm	70 mm ² 10 Nm
CL1 CL2	Control and ventilation power supply	2.5 mm ² 0,76 Nm	2.5 mm ² 0,76 Nm	2.5 mm ² 0,76 Nm	2.5 mm ² 0,76 Nm	2.5 mm ² 0,76 Nm
L1 L2 L3	Power supply	2.5 mm ² 0,76 Nm	6 mm ² 1,96 Nm	10 mm ² 2,5 Nm	35 mm ² 4 Nm	70 mm ² 10 Nm
+ -	DC bus connection	2.5 mm ² 0,76 Nm	6 mm ² 1,96 Nm	10 mm ² 2,5 Nm	35 mm ² 4 Nm	70 mm ² 10 Nm
PA PB	Connection to the braking resistor	2.5 mm ² 0,76 Nm	6mm ² 1,96 Nm	6 mm ² 1,96 Nm	16 mm ² 3 Nm	35 mm ² 4 Nm
U/T1 V/T2 W/T3	Connection to the motor	2.5 mm ² 0,76 Nm	6 mm ² 1,96 Nm	10 mm ² 2,5 Nm	35 mm ² 4 Nm	70 mm ² 10 Nm
	Earth (ground) terminal connected to Altivar earth	6 mm ² 1,96 Nm	6 mm ² 1,96 Nm	10 mm ² 2,5 Nm	35 mm ² 4 Nm	70 mm ² 10 Nm

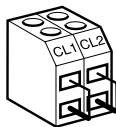
The Altivar is delivered in a configuration to ensure control of power by a circuit-breaker ([see diagram page 32](#)).

Terminals CL1-CL2 are connected to power supply L1-L2 via a strap.

Should the control power supply CL1-CL2 be supplied separately from the load power supply, it is then better to remove the tow straps so as to facilitate connection at terminals CL1-CL2 (see below).

– ATV-66U41N4 to D12N4 } Remove the straps between (CL1, CL2)
– ATV-66U41M2 to U90M2 } and (L1, L2)

– ATV-66D16N4 to D79N4 } Remove the straps at terminals CL1-CL2.
– ATV-66D12M2 to D46M2 } Unscrew the top section and then pull out the strap, leaving the bottom section simply plugged in.



Remark : For the gauges ATV-66033N4 to C31N4 or D23M2 to D46M2, the control power supply must always be present before the load power supply (where this is separate). The variator must not be in the following configuration : load power supply present, control power supply absent.

Note : if the load and control power supplies come from two separate networks with a common ground, make sure that the phases match between L1 and CL1, and between L2 and CL2.

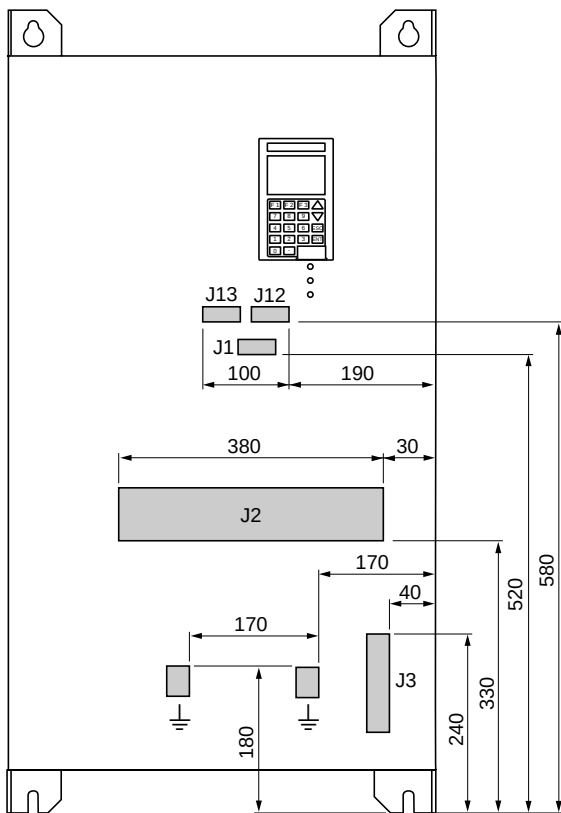


Access to terminal blocks (size 6)

For size 6 Altivars, the metal protective cover on the front panel supports the graphic terminal and the 3 LED indicators. It is attached via two captive screws.

To access the terminal blocks, unscrew the cover and pivot it from right to left. Before doing this, read the instructions on the label on the right hand side of the speed controller.

Location of terminal blocks



The connection cables enter through the base of the Altivar via holes which are fitted with cable glands in the metal plate or via the opening created by the removal of this plate ([see page 39](#)).

Inside the speed controller, there is a vertical insulating conduit on the right hand side to carry the control and signalling circuit wires.

When the plate is removed the degree of protection of the speed controller becomes IP 00.



Power terminal blocks (size 6)

Terminal blocks

J13 : control card analog I/O.

J12 : control card logic I/O.

J1 : relay logic outputs.

J2 and J3 : power terminal blocks.

J2 - terminals	Function	Maximum connection capacity <i>Terminaltightening torque</i>	
		ATV-66C10N4 and C13N4	ATV-66C15N4 and C19N4
L1 L2 L3	Power supply	120 mm ² 36,7 Nm	185 mm ² 36,7 Nm
+ –	DC bus connection	120 mm ² 36,7 Nm	185 mm ² 36,7 Nm
U/T1 V/T2 W/T3	Connection to the motor	120 mm ² 36,7 Nm	185 mm ² 36,7 Nm
J3 - terminals			
PA PB	Connection to the braking resistor	50 mm ² 5,6 Nm	50 mm ² 5,6 Nm
CL1 CL2	Control and ventilation power supply	4 mm ² 2,3 Nm	4 mm ² 2,3 Nm
	Earth (ground) terminals connected to Altivar earth	70 mm ² 10 Nm	95 mm ² 10 Nm

The Altivar is delivered in a configuration to ensure control of power by a circuit-breaker ([see diagram page 32](#)).

Terminals CL1-CL2 are connected to power supply L1-L2 via a strap.

Should the control power supply CL1-CL2 be supplied separately from the load power supply, it is then better to remove the tow straps so as to facilitate connection at terminals CL1-CL2 (see below).

– ATV-66C10N4 to C31N4 Remove the straps between (CL1, CL2) and (CL21, CL22)

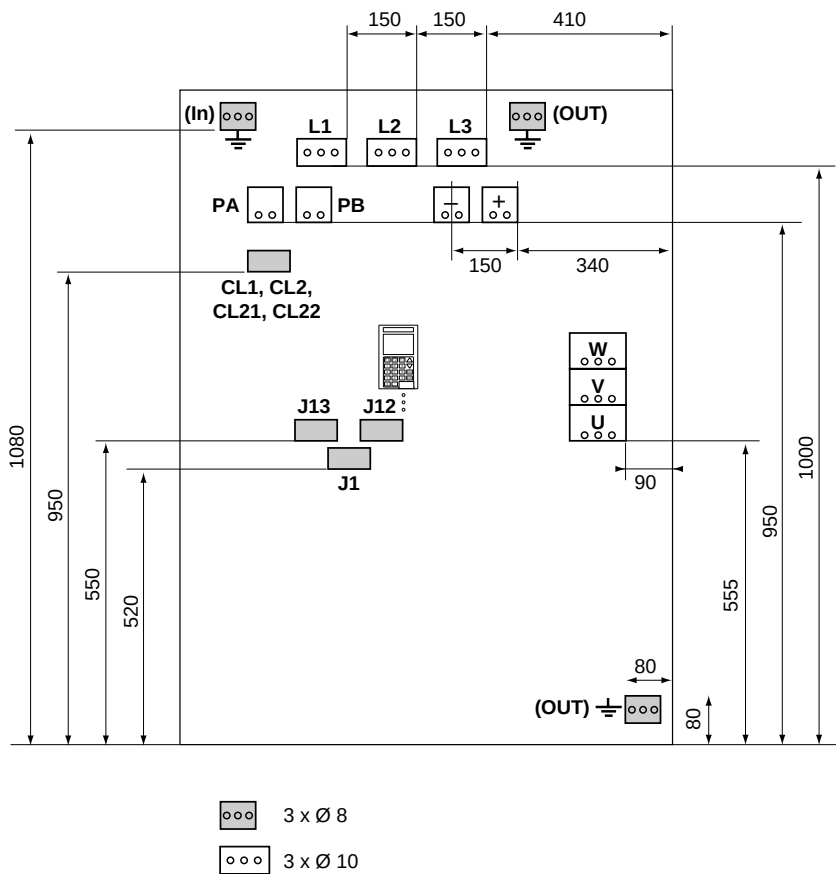
Remark : For the gauges ATV-66033N4 to C31N4 or D23M2 to D46M2, the control power supply must always be present before the load power supply (where this is separate). The variator must not be in the following configuration : load power supply present, control power supply absent.



Access to terminal blocks (size 7)

The size 7 Altivars have no metal protecting cover on the front face (variator protection class IP 00). The terminal and the 3 indicator LEDs are installed on the insulating rank of the control card.

Location of terminal blocks





Power terminal blocks (size 7)

Terminal blocks

J13 : control card analog I/O.

J12 : control card logic I/O.

J1 : relay logic outputs.

J2 - terminals	Function	Maximum connection capacity <i>Terminaltightening torque</i> ATV-66C23N4 to C31N4
L1 L2 L3	Power supply	3 x 240 mm ² 42,4 Nm
+ —	DC bus connection	2 x 240 mm ² 42,4 Nm
U/T1 V/T2 W/T3	Connection to the motor	3 x 240 mm ² 42,4 Nm
CL1 CL2	Control and ventilation power supply	4 mm ² 2,3 Nm
PA PB	Connection to the braking resistor	2 x 240 mm ² 42,4 Nm
CL21 CL22	Terminals for common load/control power supply	4 mm ² 2,3 Nm
	Earth (ground) terminals connected to Altivar earth	3 x 240 mm ² 42,4 Nm

The Altivar is delivered in a configuration to ensure control of power by a circuit-breaker ([see diagram page 32](#)).

Terminals CL1-CL2 are connected to power supply L1-L2 via a strap.

Should the control power supply CL1-CL2 be supplied separately from the load power supply, it is then better to remove the tow straps so as to facilitate connection at terminals CL1-CL2 (see below).

– ATV-66C10N4 to C31N4 Remove the straps between (CL1, CL2) and (CL21, CL22)

Remark : For the gauges ATV-66033N4 to C31N4 or D23M2 to D46M2, the control power supply must always be present before the load power supply (where this is separate). The variator must not be in the following configuration : load power supply present, control power supply absent.

Note : if the load and control power supplies come from two separate networks with a common ground, make sure that the phases match between L1 and CL1, and between L2 and CL2.



Control terminal blocks

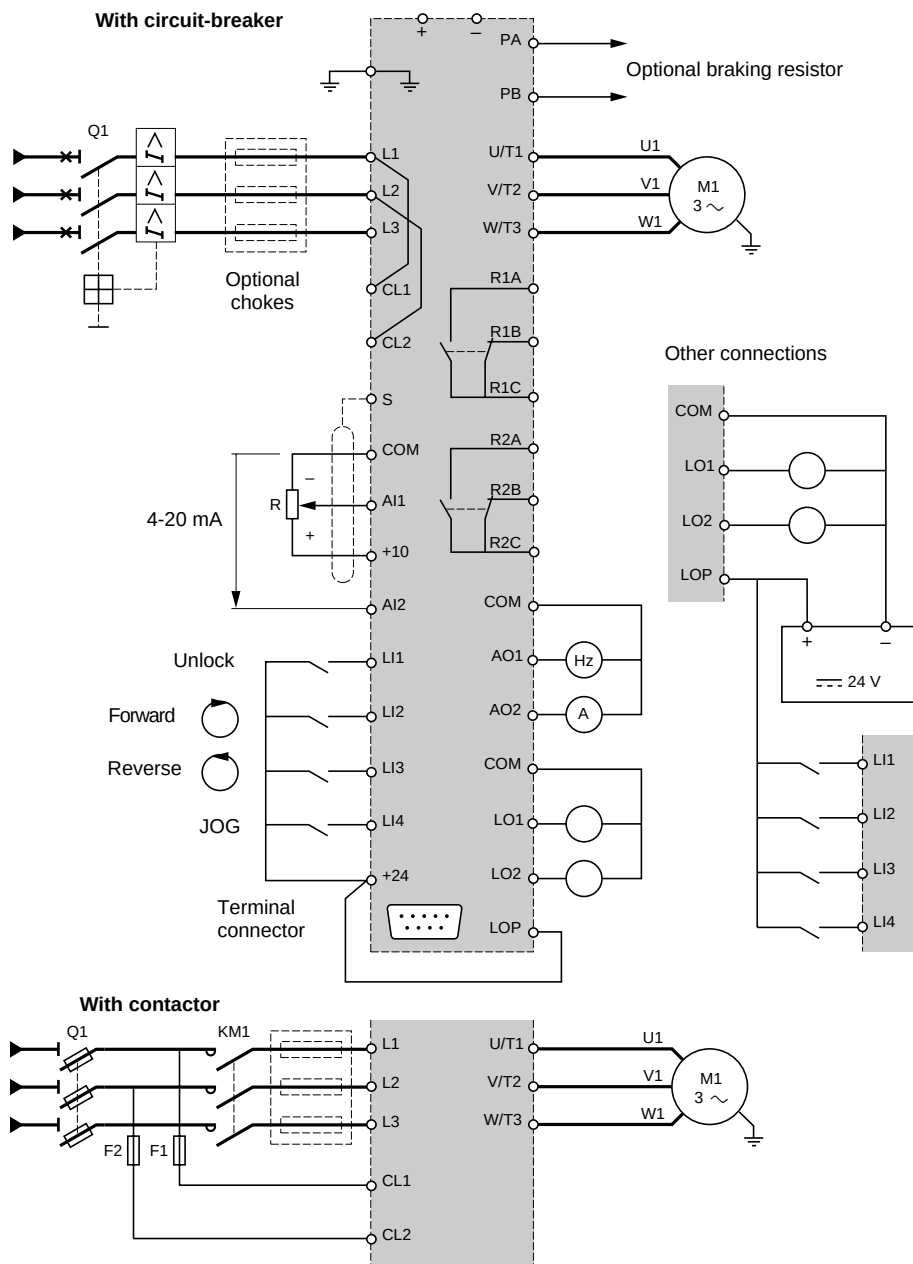
Terminal blocks J13, J12 and J1 have plug-in connectors with a coding chip.
Maximum connection capacity : 2.5 mm².

Factory configuration of the speed controller

J13-J12 terminals	Function	Characteristics
S	Connection of screening to reference circuits	Earth (ground) terminal connected to Altivar earth
	Terminal not connected	
COM	Analog input common	0 V
AI1	Voltage speed reference	Analog input 0-10 V, impedance 30 k Ω
+10	Supply to speed reference potentiometer R	+ 10 V isolated and regulated, maximum 10 mA, recommended value of R between 1 k Ω and 10 k Ω
AI2	Current speed reference	Analog input 4-20 mA, impedance 250 Ω 0-5 V, impedance 30 k Ω
AO1 AO2	Output frequency Output current	2 analog outputs 0-20 mA, maximum recommended load impedance 500 Ω
COM	Analog output common	0 V
LI1 LI2 LI3 LI4	Unlock speed controller Forward operation command Reverse operation command Step by step operation (JOG)	4 logic inputs, impedance 3.5 k Ω , supply + 24 V (min 11 V, max 30 V), state 0 if < 5 V, state 1 if $\geq$ 11 V
+24	Supply to logic inputs	+ 24 V isolated and not regulated (min 20 V, max 30 V), maximum 200 mA
LOP	Supply to logic outputs	Connect to + 24 V of internal supply or of an external supply
LO1 LO2	Speed reached Current limit reached	2 PLC compatible logic outputs (open collector), + 24 V (max 32 V), max 20 mA with internal supply or 200 mA with external supply
COM	Logic output common	0 V
J1 terminals		
R1A R1B R1C	C/O contact on relay R1 : activated on power up, de-activated at a fault	Switching capacity of contacts : min 10 mA for 24 V DC, max for inductive load ($\cos \varphi = 0.4$ and $L/R = 7$ ms) : 1.5 A for 250 V AC or 2.5 A for 30 V DC
R2A R2B R2C	C/O contact on relay R2 : activated when speed controller operating (detection of current in the motor)	



Connection diagrams



Access to terminals CL1-CL2 : remove the 2 straps. When load power supply L1-L2-L3 is present or when supplied by the DC bus (+, -), power supply CL1-CL2 must always be present.



Ferrite core installation and recommendations

Wiring precautions

Power

Respect the cable cross-sections recommended by the standards ([see page 36](#)).

Speed controller-motor connection cables :

- minimum length : 0.5 m,
- maximum length 100 m with non-screened cables, or 50 m with screened cables.

Above this, install an L or LC filter between the speed controller and the motor (refer to the catalogue).

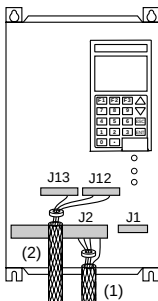
The speed controller must be connected to earth (ground), in order to conform with the regulations covering high leakage currents (above 3.5 mA). Use of a differential circuit-breaker upstream is not recommended since DC components could be generated by leakage currents from the speed controller. If the installation comprises several speed controllers on the same line, connect each controller to earth separately. If necessary, install a line choke (refer to the catalogue).

Keep the power cables separate from the low level signal circuits in the installation (detectors, PLCs, measuring apparatus, video, telephone).

Control

Keep the control circuits separate from the power cables. For the speed reference circuits, it is recommended that twisted cable with a pitch of between 25 and 50 mm is used, or screened cable with the screening connected to terminal S.

Ferrite core installation



The options to enable compliance with the EMC directive are those indicated in our documentation (EMC Catalogue No. 75011). These items need to be ordered separately.

The only items delivered with the product are :

- The control cable ferrite (blue) : "control ferrite core".
- The motor cable ferrite (red) : "motor ferrite core".

- (1) motor cable
- (2) control cable

The ferrites must be installed on the unscreened cable as close as possible to the terminals on the Altivar.

Please note : Schneider organisation is at your disposal to provide any assistance required in terms of Documentation, Practical Advice, Technical Assistance, EMC Training Courses.

Selection of associated components

Circuit-breaker or isolator Q1 (with gl type fuses) : determine according to the line current, plus the consumption of the other parts of the device.

Contactor KM1 : select for category AC-1, according to the line current.

Fuses F1-F2 : determine according to the AC supply voltage and the rating of the control and ventilation power supply transformer (terminals CL1-CL2) :

- ATV-66U41N4 to D23N4 (sizes 1 to 3) : 40 VA,
and ATV-66U41M2 to D16M2
- ATV-66D33N4 to D79N4 (sizes 4 and 5) : 110 VA,
and ATV-66D23M2 to D46M2
- ATV-66C10N4 to C19N4 (size 6) : 630 VA,
– ATV-66C23N4 to C31N4 (size 7) : 1000 VA.



Recommendations

Reassignment of I/O

The following I/O can be reassigned via the graphic terminal : logic inputs LI3 and LI4, logic outputs LO1 and LO2, relay output R2, and analog outputs AO1 and AO2.

The characteristics of current input AI2 and analog outputs AO1 and AO2 can also be modified using the graphic terminal :

- input AI2 : 4-20 mA, 0-20 mA, 20-4 mA, X-20 mA (X programmable : resolution 0.1 mA),
- outputs AO1 and AO2 : 0-20 mA or 4-20 mA.

This is described in more detail [in the Programming Manual](#).

A switch on the control card (to the left of terminal block J13) is used to convert input AI2 to a 0-5 V reference input (after having configured it as 0-20 mA via the graphic terminal).

Minimum braking resistance values

Using a lower resistance value than the one given in the table below will cause the resistance thermal protection to become inefficient.

Reference	Min. value (Ω)	Reference	Min. value (Ω)
ATV-66U41N4	56	ATV-66U41M2	41
ATV-66U54N4	56	ATV-66U72M2	28
ATV-66U72N4	56	ATV-66U90M2	14
ATV-66U90N4	54	ATV-66D12M2	10
ATV-66D12N4	50	ATV-66D16M2	10
ATV-66D16N4	27	ATV-66D23M2	7,5
ATV-66D23N4	27	ATV-66D33M2	5
ATV-66D33N4	14	ATV-66D46M2	2,7
ATV-66D46N4	14		
ATV-66D54N4	10		
ATV-66D64N4	5		
ATV-66D79N4	5		
ATV-66C10N4	2,5		
ATV-66C13N4	2,5		
ATV-66C15N4	2,5		
ATV-66C19N4	2,5		



Command type

2 or 3-wire command

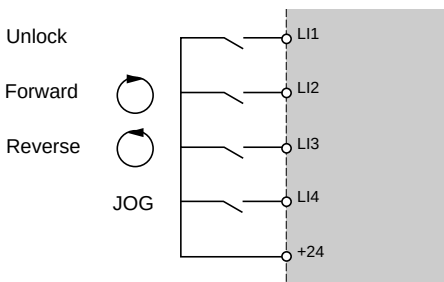
2-wire command : logic states maintained (factory setting for the speed controller).

3-wire command : pulse control (selected via the graphic terminal).

2-wire command

Input LI1 :

- change to state 1 : controller unlocked,
- change to state 0 : speed controller locked and "freewheel" stop of motor.



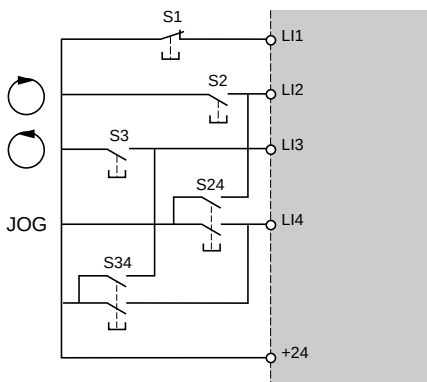
To stop the motor following the deceleration ramp, inhibit the direction command on the enabled input LI2 or LI3.

Step by step function (JOG) : enable input LI4 before unlocking using input LI1, apply pulses to input LI2 or LI3 (direction of operation).

3-wire command

Input LI1 :

- change to state 1 : controller unlocked,
- change to state 0 : stop motor following deceleration ramp.



S1 Stop

S2 Forward operation

S3 Reverse operation

S24 Step by step (JOG) forward

S34 Step by step (JOG) reverse

Step by step operation (JOG) only lasts as long as the pulse command.

Characteristics common to both methods of command :

- the first direction command selected takes priority over the other,
- if the two direction commands are enabled simultaneously, forward operation takes priority.



Cable cross-sections

Power cables to terminals L1-L2-L3 and U/T1-V/T2-W/T3

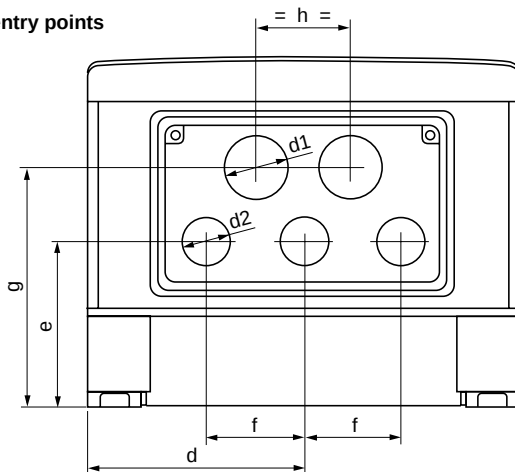
Altivar reference	Cable cross-section recommended by IEC 947-1 standards mm ²
ATV-66U41N4	2,5
ATV-66U54N4	2,5
ATV-66U72N4	2,5
ATV-66U90N4	4
ATV-66D12N4	6
ATV-66D16N4	6
ATV-66D23N4	10
ATV-66D33N4	25
ATV-66D46N4	35
ATV-66D54N4	35
ATV-66D64N4	50
ATV-66D79N4	50
ATV-66C10N4	95
ATV-66C13N4	120
ATV-66C15N4	185
ATV-66C19N4	185
ATV-66C23N4	150 x 2 (2 cables)
ATV-66C28N4	185 x 2 (2 cables)
ATV-66C31N4	185 x 2 (2 cables)
ATV-66U41M2	2,5
ATV-66U72M2	4
ATV-66U90M2	6
ATV-66D12M2	6
ATV-66D16M2	10
ATV-66D23M2	25
ATV-66D33M2	35
ATV-66D46M2	35



Cable entry points

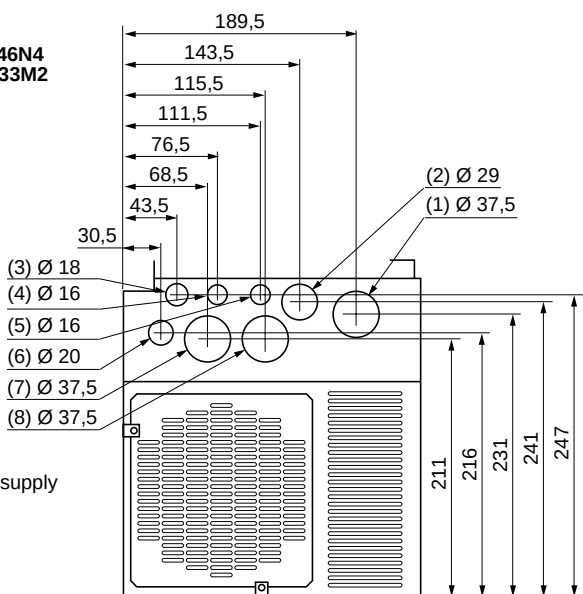
View from below showing cable entry points

Sizes 1 to 5



Size	Altivar reference	d1	d2	d	e	f	g	h
1	ATV-66U41N4 to U72N4 ATV-66U41M2	29	22	100	79	45	113	43
2	ATV-66U90N4 & D12N4 ATV-66U72M2 & U90M2	29	29	117	106	58	134	58
3	ATV-66D16N4 & D23N4 ATV-66D12M2 & D16M2	29	29	117	147	58	175	58

Size 4 ATV-66D33N4 & D46N4
ATV-66D23M2 & D33M2



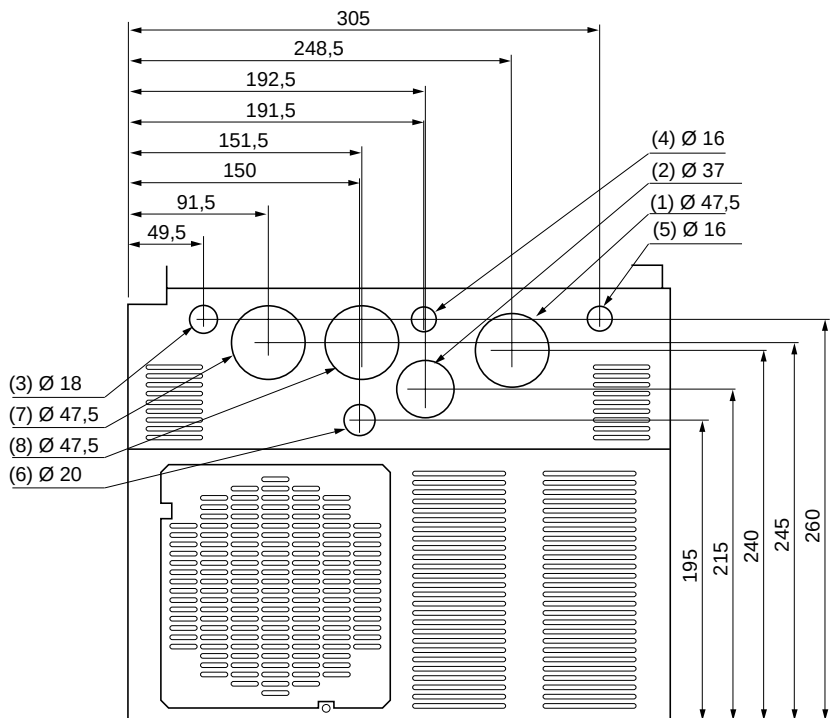
- 1 - Motor output
- 2 - PA / PB output
- 3 - Separate control power supply
- 4 - Option board
- 5 - Monitoring control
- 6 - Relay output
- 7 - Power supply
- 8 - + / - output



Cable entry points

View from below showing cable entry points

Size 5 : ATV-66D54N4 to D79N4
ATV-66D46M2



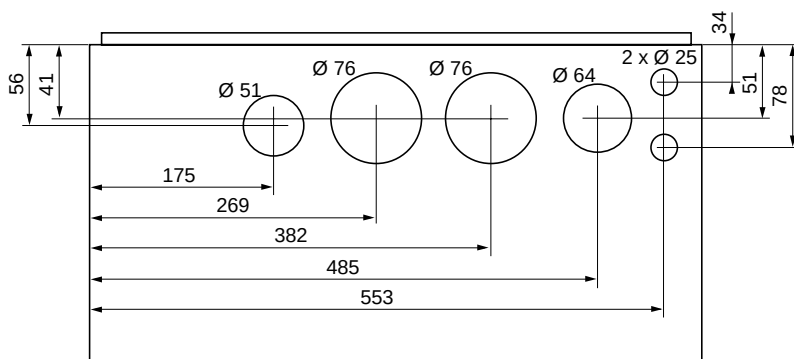
- 1 - Motor output
- 2 - PA / PB output
- 3 - Separate control power supply
- 4 - Option board
- 5 - Monitoring control
- 6 - Relay output
- 7 - Power supply
- 8 - + / - output



Cable entry points

View from below showing cable entry points

Size 6 : ATV-66C10N4 to C19N4



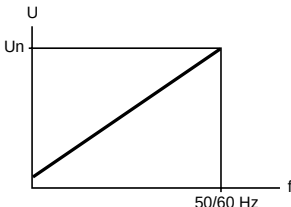


Start-up

The Altivar is factory-set for the most widely used operating conditions :

- **constant torque applications,**
- **2-wire command.**

Factory settings

Nominal output frequency and voltage	Automatic adaptation on 1st power-up to the AC supply frequency 50 Hz AC supply : 400 V 60 Hz AC supply : 460 V
Voltage / frequency ratio	Normal linear ratio, IR compensation set at 100 % of the correction range, damping set at 20 % of the adjustment range Applications : machines with average load at low speed 
Slip compensation	Operational and automatic
Operating frequency range	50 Hz AC supply : 0.1 to 75 Hz 60 Hz AC supply : 0.1 to 90 Hz
Ramp times	Acceleration : 3 s Deceleration : 3 s Automatic adaptation of the ramp times in the event of the torque capacity being exceeded
Braking to standstill at low speed	Automatic by DC injection (0.7 Inv) for 0.5 s as soon as the deceleration frequency becomes < 0.1 Hz
Motor thermal protection	Set for a motor nominal current equal to 0.9 Inv
JOG function	Speed limited to 5 Hz, ramp times : 0.1 s Dead time between 2 pulses : 0.5 s

If the above values are compatible with the application, the speed controller can be powered up. To understand the messages displayed, [see the Programming Manual](#).

If necessary, reconfigure the controller and the settings using the graphic terminal : [see the Programming Manual](#).

When power switching using a **line contactor** ([see diagram on page 32](#)) :



- **Avoid frequent operation of contactor KM1** (premature ageing of the filtering capacitors), **use inputs LI1 to LI4 to control the speed controller.**
- **For cycles < 60 s, this is essential.** If it is not respected the load resistors will be damaged.
- If the safety standards state that the motor must be insulated, install a contactor at the speed controller output and use the “bypass” function ([see the Programming Manual](#)).



Signalling on the Altivar front panel

Red LED  on : Altivar faulty

Yellow LED  on : Altivar is operating in current limiting mode or automatic ramp adjustment mode

Green LED  on : Altivar powered up (voltage at terminals CL1-CL2)

Yellow LED flashing : thermal early warning indicating speed controller and motor overheated (ATV-66D16N4 to C31N4 and ATV-66D12M2 to D46M2 only). Locks at the fault 1 minute later if the overheating persists.

Display mode on the graphic terminal screen

Display of the factory set frequency reference, or of a fault.

Display mode can be modified via the graphic terminal : [see the Programming Manual](#).



Maintenance

Before performing any operation on the speed controller, **switch off the power supply and wait for the capacitors to discharge** (approximately 1 minute) : the red LED inside the speed controller (visible when the protective cover is removed) goes off.



The DC voltage at terminals + and – or PA and PB may reach 800 to 900 V depending on the supply voltage.

In the event of a problem during start-up or operation, check first that the recommendations relating to the environment, mounting and connection have been respected.

Servicing

The Altivar 66 does not require any preventive servicing.
It is however advisable to perform the following at regular intervals :

- check the state and tightness of connections,
- check that the temperature around the device remains at an acceptable level, and that the ventilation is efficient (average lifetime for fans : 3 to 5 years depending on the operating conditions),
- remove dust from the speed controller if necessary.

Maintenance assistance

The first fault detected is memorized and displayed on the graphic terminal screen if the control voltage (terminals CL1-CL2) is maintained : the speed controller locks, the red LED lights, and security relay R1 is tripped.

Clearing the fault

Switch off the power supply to the speed controller : to the power terminals in the event of a fault which can be reset, to the power and control terminals in the event of a fault which cannot be reset (see the following pages).

Find the cause of the fault in order to correct it.

Reconnect the power supply : this clears the fault if it has disappeared.

In some cases, the speed controller may restart automatically when the fault has disappeared, if this function has been programmed using the graphic terminal ([see the Programming Manual](#)).



Maintenance assistance

Faults which can be reset

Fault	Probable cause	Remedial procedure
Input phase loss	– incorrect supply to controller or melting of fuses – transient fault of one phase of the AC supply ($t \geq 1$ s)	– check the connection and the power fuses – reset
Undervoltage	– AC supply too low – transient voltage dip ($t \geq 200$ ms) – load resistor damaged	– check the voltage or the motor parameter U_n via the graphic terminal – reset – change the resistor
AC-line overvoltage	– AC supply too high	– check the voltage or the motor parameter U_n via the graphic terminal
Drive overtemperature	– heatsink temperature too high	– check the motor load, the speed controller ventilation and the environment, and wait for the controller to cool before resetting
Motor overload	– thermal tripping caused by prolonged overload	– check the adjustment of the thermal protection via the graphic terminal, check the motor load – can be reset after approximately 7 minutes
DC-bus overvoltage	– excessive braking or driving load	– increase the deceleration time via the graphic terminal, add a braking resistor if necessary
Output phase loss	– fault on one phase at speed controller output	– check the motor connections
Loss follower	– loss of the 4-20 mA reference on input AI2	– check the connection of the reference circuits
Serial link	– communication fault via the serial link	– check the connection of the graphic terminal to the speed controller – check the connection of the communication option and of the PLC
Overspeed	– Motor control loss	– Excessively high motor load



Maintenance assistance

Faults which cannot be reset

Fault	Probable cause	Remedial procedure
Short-circuit Ground fault	– short-circuit or earthing (grounding) at speed controller output	– check the connection cables (with the speed controller disconnected) and the motor insulation, check the speed controller using the graphic terminal in diagnostic mode
Precharge failure	– control fault in the capacitor charging relay – load resistor damaged	– check the connections in the speed controller and the load resistor
Internal fault	– internal fault – connection fault	– check the speed controller using the graphic terminal in diagnostic mode – check the connections in the speed controller
Memory failure	– memory error in EEPROM	– return to factory settings or client settings using the graphic terminal
Transistor short-circuit Open transistor Dynamic brake fault (fault detected if braking resistor present)	– transistor fault detected by the automatic self-test each time the speed controller is powered up	– check the speed controller using the graphic terminal in diagnostic mode

Other faults may appear if they have been programmed using the graphic terminal ([see the Programming Manual](#)).



Spare parts

Description	For speed controllers	Reference
Programming graphic terminal	ATV-66 all sizes	VW3-A66206
Control terminal blocks (plug-in parts of terminal blocks J1 - J12 - J13)	ATV-66 all sizes	VZ3-N006
Set of two-ferrite cores	ATV-66U41N4 to D46N4	VW3-A66470
	ATV-66U41M2 to D33M2	VW3-A66470
	ATV-66D54N4 to D79N4	VW3-A66471
	ATV-66D46M2	VW3-A66471
"Controle" card (with isolating basket)	ATV-66U41N4 to D79N4	VX4-A661
	ATV-66U41M2 to D46M2	VX4-A661
	ATV-66C10N4 to C19N4	VX4-A661S238
	ATV-66C23N4 to C31N4	VX4-A661S238
"Power" assemblies	ATV-66U41N4	VX5-A66U41N4
	ATV-66U54N4	VX5-A66U54N4
	ATV-66U72N4	VX5-A66U72N4
	ATV-66U41M2	VX5-A66U41M2
	ATV-66U90N4	VX5-A66U90N4
	ATV-66D12N4	VX5-A66D12N4
"Power" cards	ATV-66U72M2	VX5-A66U72M2
	ATV-66U90M2	VX5-A66U90M2
	TV-66D16N4	VX5-A66D16N4
	ATV-66D23N4	VX5-A66D23N4
Tool for removing and inserting the power card	ATV-66D12M2	VX5-A66D12M2
	ATV-66D16M2	VX5-A66D16M2
	ATV-66U41N4 to D23N4	VY1-ADV608
	ATV-66U41M2 to D16M2	VY1-ADV608
"Power" cards	ATV-66D33N4	VX5-A66D33N4
	ATV-66D46N4	VX5-A66D46N4
	ATV-66D23M2	VX5-A66D23M2
	ATV-66D33M2	VX5-A66D33M2
	ATV-66D54N4	VX5-A66D54N4
	ATV-66D64N4	VX5-A66D64N4
	ATV-66D79N4	VX5-A66D79N4
	ATV-66D46M2	VX5-A66D46M2
	ATV-66C10N4	VX5-A66C10N4
	ATV-66C13N4	VX5-A66C13N4
	ATV-66C15N4	VX5-A66C15N4
	ATV-66C19N4	VX5-A66C19N4
	ATV-66C23N4	VX5-A66C23N4
	ATV-66C28N4	VX5-A66C28N4
	ATV-66C31N4	VX5-A66C31N4



Spare parts

Description	For speed controllers	Reference
"Channel control" cards	ATV-66D16N4	VX5-A66103
	ATV-66D23N4	VX5-A66104
	ATV-66D12M2	VX5-A66112
	ATV-66D16M2	VX5-A66113
	ATV-66D33N4	VX5-A66105
	ATV-66D46N4	VX5-A66106
	ATV-66D23M2	VX5-A66114
	ATV-66D33M2	VX5-A66115
	ATV-66D54N4	VX5-A66107
	ATV-66D64N4	VX5-A66108
	ATV-66D79N4	VX5-A66109
	ATV-66D46M2	VX5-A66116
	ATV-66D16N4 and D23N4	VX4-A66103
	ATV-66D12M2 and D16M2	VX4-A66103
"Filter" cards	ATV-66D33N4 and D46N4	VX4-A66104
	ATV-66D23M2 and D33M2	VX4-A66104
	ATV-66D54N4 to D79N4	VX4-A66105
	ATV-66D46M2	VX4-A66105
	ATV-66C10N4 to C19N4	VX4-A66106
	ATV-66D33N4 to D79N4	VY1-ADA604
	ATV-66D23M2 and D46M2	VY1-ADA614
Transformers	ATV-66C10N4 to C19N4	VY1-ADA606
	ATV-66C23N4 to C31N4	VY1-ADA607
	ATV-66D33N4 and D46N4	VY1-A66104
	ATV-66D23M2	VY1-A66104
Current sensors (set of 2)	ATV-66D33M2	VY1-A66105
	ATV-66D54N4 to D79N4	VY1-A66105
	ATV-66D33M2 to D46M2	VY1-A66105
	ATV-66C10N4 and C13N4	VY1-A66106
	ATV-66C15N4 and C19N4	VY1-A66107
	ATV-66C23N4 to C31N4	VY1-A66108



Spare parts

Description	Characteristics	For speed controllers	Reference
Modules with 2 IGBT	50 A - 1200 V	ATV-66D16N4	VZ3-IM2050M1201
	75 A - 1200 V	ATV-66D23N4	VZ3-IM2075M1201
	100 A - 1200 V	ATV-66D33N4	VZ3-IM2100M1201
	150 A - 1200 V	ATV-66D46N4 and D54N4	VZ3-IM2150M1201
	200 A - 1200 V	ATV-66D64N4	VZ3-IM2200M1201
	300 A - 1200 V	ATV-66D79N4	VZ3-IM2300M1201
	75 A - 600 V	ATV-66D12M2	VZ3-IM2075M0601
	100 A - 600 V	ATV-66D16M2	VZ3-IM2100M0601
	150 A - 600 V	ATV-66D23M2	VZ3-IM2150M0601
	200 A - 600 V	ATV-66D33M2	VZ3-IM2200M0601
	300 A - 600 V	ATV-66D46M2	VZ3-IM2300M0601
Kits comprising : – 2 modules with 1 IGBT – cards	300 A - 1200 V	ATV-66C10N4	VZ3-IM1300M1206
	400 A - 1200 V	ATV-66C13N4 and C15N4	VZ3-IM1400M1206
	500 A - 1200 V	ATV-66C19N4	VZ3-IM1500M1206
Kits comprising : – 4 modules with 1 IGBT – cards	400 A - 1200 V	ATV-66C23N4 to C28N4	VZ3-IM1400M1207
	500 A - 1200 V	ATV-66C31N4	VZ3-IM1500M1207
IGBT braking transistor modules	25 A - 1000 V	ATV-66D16N4 and D23N4	VZ3-IM1025M1001
	50 A - 1200 V	ATV-66D33N4 and D46N4	VZ3-IM2050M1201
	100 A - 1200 V	ATV-66D54N4	VZ3-IM2100M1201
	150 A - 1200 V	ATV-66D64N4 and D79N4	VZ3-IM2150M1201
	60 A - 600 V	ATV-66D12M2 and D16M2	VZ3-IM1060M0601
	75 A - 600 V	ATV-66D23M2	VZ3-IM2075M0601
	100 A - 600 V	ATV-66D33M2	VZ3-IM2100M0601
	150 A - 600 V	ATV-66D46M2	VZ3-IM2150M0601
	300 A - 1200 V	ATV-66C10N4 to C19N4	VZ3-IM1300M1207
	400 A - 1200 V	ATV-66C23N4	VZ3-IM1400M1208
IGBT braking transistor and card kit	400 A - 1200 V	ATV-66C28N4 to C31N4	VZ3-IM1300M1208
Rectifier with 6 diodes	75 A - 1600 V	ATV-66D16N4 and D23N4	VZ3-DM6075M1601
	75 A - 1600 V	ATV-66D12M2 and D16M2	VZ3-DM6075M1601
Rectifiers with 2 diodes	80 A - 1600 V	ATV-66D33N4	VZ3-DM2080M1606
	100 A - 1600 V	ATV-66D46N4	VZ3-DM2100M1601
	160 A - 1600 V	ATV-66D54N4 to D79N4	VZ3-DM2160M1606
	80 A - 1600 V	ATV-66D23M2	VZ3-DM2080M1606
	100 A - 1600 V	ATV-66D33M2	VZ3-DM2100M1601
	160 A - 1600 V	ATV-66D46M2	VZ3-DM2160M1606
Kit to 3 modules of 2 diodes	170 A - 1600 V	ATV-66C10N4 and C13N4	VZ3-DM2170M1601
	260 A - 1600 V	ATV-66C15N4	VZ3-DM2260M1601
	350 A - 1600 V	ATV-66C19N4	VZ3-DM2350M1601
	600 A - 1600 V	ATV-66C23N4 to C31N4	VZ3-DM2600M1601



Spare parts

Description	Characteristics	For speed controllers	Reference
Cooling sub-assemblies	Rate 5 dm ³ /s	ATV-66U41N4 and U54N4	VZ3-V661
	Rate 10 dm ³ /s	ATV-66U72N4	VZ3-V662
	Rate 22 dm ³ /s	ATV-66U90N4 and D12N4	VZ3-V663
	Rate 47 dm ³ /s	ATV-66D16N4 and D23N4	VZ3-V664
	Rate 100 dm ³ /s	ATV-66D33N4 to D79N4	VZ3-V665
	Rate 250 dm ³ /s	ATV-66C10N4 to C31N4	VZ3-V666
	Rate 10 dm ³ /s	ATV-66U41M2	VZ3-V662
	Rate 22 dm ³ /s	ATV-66U72M2 and U90M2	VZ3-V663
Internal cooling units	Rate 47 dm ³ /s	ATV-66D12M2 and D16M2	VZ3-V664
	Rate 100 dm ³ /s	ATV-66D23M2 to D46M2	VZ3-V665
	Rate 11 dm ³ /s	ATV-66D33N4 and D46N4	VZ3-V6654
	Rate 14 dm ³ /s	ATV-66D54N4 to D79N4	VZ3-V6655
	Rate 14 dm ³ /s	ATV-66C10N4 to C19N4	VZ3-V667
Load resistors	Rate 18 dm ³ /s	ATV-66C23N4 to C31N4	VZ3-V669
	Rate 11 dm ³ /s	ATV-66D23M2 and D33M2	VZ3-V6654
	Rate 14 dm ³ /s	ATV-66D46M2	VZ3-V6655
	33 Ω - 8,5 W	ATV-66D16N4 and D23N4	VZ3-R033W009
	10 Ω - 25 W	ATV-66D33N4 and D46N4	VZ3-R010W025
Control fuse	10 Ω - 480 W	ATV-66D54N4 to C31N4	VZ3-R010W481
	33 Ω - 8,5 W	ATV-66D12M2 and D16M2	VZ3-R033W009
	10 Ω - 25 W	ATV-66D23M2 and D33M2	VZ3-R010W025
	10 Ω - 480 W	ATV-66D46M2	VZ3-R010W481
DC bus protection fuses	5 A - 600(8,5 x 31,5)	ATV-66C10N4 to C31N4	DF3-CF00501
Capacitors	400 A - 700 V	ATV-66C10N4 and C13N4	VY1-ADF400V700
	450 A - 700 V	ATV-66C15N4 and C19N4	VY1-ADF450V700
		ATV-66C23N4 and C31N4	VY1-ADF400V700
		ATV-66D16N4 and D23N4	VY1-ADC152V450
Capacitor sub-assemblies		ATV-66D33N4 and D46N4	VY1-ADC472V450
		ATV-66D12M2 and D16M2	VY1-ADC152V450
		ATV-66D23M2 and D33M2	VY1-ADC472V450
		ATV-66D54N4	VY1-ADC605
Discharge resistors		ATV-66D64N4 and D79N4	VY1-ADC606
		ATV-66C10N4 to C19N4	VY1-ADC607
		ATV-66C23N4 to C31N4	VY1-ADC608
		ATV-66D46M2	VY1-ADC605
Temperature sensor kit	5 kΩ - 40 W	ATV-66D33N4 to D79N4	VZ3-R5K0W040
	640 Ω - 135 W	ATV-66D10N4 to D19N4	VZ3-R640W135
	1,2 kΩ - 480 W	ATV-66D23N4 to D31N4	VZ3-R1K2W480
Contactors	5 kΩ - 40 W	ATV-66D23M2 to D46M2	VZ3R5K0W040
		ATV-66C10N4 to C19N4	VZ3-G003
Auxiliary contact		ATV-66C23N4 and C31N4	VZ3-G004
		ATV-66C10N4 to C13N4	VY1-A661C1010
		ATV-66C15N4 and C19N4	VY1-A661C1510
Circuit breaker		ATV-66C23N4 to C31N4	VY1-A661C2310
			LA1-DN04
			GV2M10



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